UNIVERSITY OF MICHIGAN

The American Fertilizer

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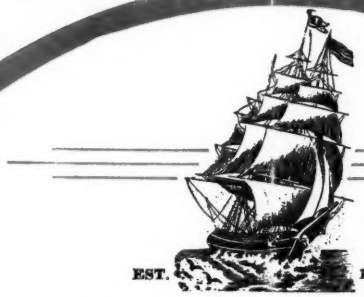

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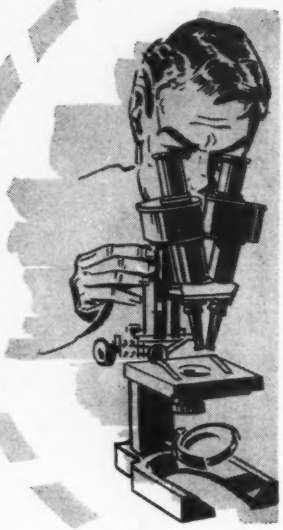

THE MICROSCOPE . . .

is playing an ever increasing role in the manufacture of fertilizer. Experimentation in soil chemistry by universities and government laboratories has proved that much of the soil of the United States is deficient in BORON . . . that element in Borax essential to full plant development.

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THE strategic factory locations of the American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

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Our plant at Trona, Calif., is operating at capacity to provide supplies of these essential plant foods, and other materials needed in the national effort.

Manufacturers of Three Elephant Borax and Boric Acid

See Page 25

...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 96 FEBRUARY 14, 1942 No. 4

Higher Analysis Fertilizers as Related to The Victory Program*

By A. L. MEHRING

U. S. Department of Agriculture, Washington, D. C.

IN the manufacture of fertilizers, formulas are used providing for one ton of a definite grade. The total weight of the various materials required to supply the necessary quantities of the three primary plant foods, nitrogen, phosphoric acid, and potash, in grades customarily demanded will usually be less than a ton. The custom, therefore, is to add other material not containing any appreciable quantities of these three plant foods in order to bring the weight of the mixture to exactly one ton.

For many years the average plant-food content of the materials available for making mixed fertilizers has been increasing, and in the past few years at a very rapid rate. The average total plant-food content of the mixed fertilizers made from these materials has been increasing also but at a much slower rate. As a result more and more of the material containing none of the primary plant foods has been added in order to produce the old-fashioned, low-analysis grades of mixed fertilizer still demanded by many farmers.

When a material added to a fertilizer does not materially increase its efficiency in promoting crop growth it is known as filler. Thus enough limestone added to a mixture to neutralize its physiological acidity would not be filler if the fertilizer was intended for a highly acid soil. However, many of the soils in the West and some in the East contain enough calcium and are improved for certain crops by the use of physiologically acid fertilizers. In such cases limestone in any quantity would be a filler.

Filler is usually ordinary sand, but many materials have been used, including limestone, spent fuller's earth, rock salt, coal ashes, grit removed in the preparation of refined chalk, peanut hulls, spent foundry sand, sawdust, etc.

The exact quantity of filler used in making commercial fertilizers is unknown. Mehring[1] has estimated the quantities consumed in certain years as follows:

Year	Short tons	Per cent of Total fertilizer consumption
1880	5,000	0.7
1890	50,000	2.9
1900	112,000	3.5
1910	258,000	4.6
1920	635,000	8.8
1930	730,000	8.7
1937	510,000	6.1

It will be observed that very little filler was used in 1880 but that the quantity increased until sometime between 1920 and 1930 and since then appears to have decreased. The reason for the decrease is that in 1928 dolomite began to be added in rapidly increasing quantities and this has not been considered as filler in the above figures.

The purpose of this article is to give some later figures on the use of filler and to emphasize the importance at this time of getting rid of as much of it as possible.

The 1939 census of manufactures gives the tonnages of the various materials used in making mixed fertilizers as reported by the industry. It also gives the tonnages of mixed fertilizers made and the average grades reported.

* Reprinted from "Better Crops with Plant Food," January, 1942, issue.

[1] The Magnesium Content of Fertilizers 1850 to 1937, A. L. Mehring, 1939 Yearbook of Commercial Fertilizer 32-41.

Table 1 gives those figures, supplemented by some additional data obtained from other official sources. Most, if not all, of the 268,959 tons of "all other materials containing plant food" as shown in the table consisted of peat, peanut hulls, open-hearth basic slag, dried manure, vegetable meal, manganese sulphate, copper sulphate, and other such materials containing little or no available nitrogen, phosphoric acid, or potash.

The manufacturers were required to report to the Census Bureau the tonnages of materials containing plant food consumed, but did not have to report materials such as sand, limestone, dolomite, etc. Of the difference of approximately 1,000,000 tons between the tonnage of mixed goods made and the total of the tonnages of materials containing plant food used in making them, about 300,000 tons consisted of liming materials such as limestone, dolomite, etc. Therefore, about 700,000 tons must have been sand and similar inert material.

The cost of manufacturing and distributing mixed fertilizers exclusive of the cost of the raw materials is about $11.00 a ton, and that has to be paid by the farmer even if the product he buys is nearly all sand. When used, the cost of the filler material also is added to the $11.00 that must be paid by the farmer.

M. H. Lockwood of the Eastern States Farmers' Exchange made a careful study of the costs of delivering plant food to the farmer. He found that for every dollar paid by the farmer for 3-6-6 fertilizer 48 cents went for the purchase of materials and filler and 52 cents for the cost of manufacture, bags, and distribution. The cost of the materials required to make the equivalent quantity of 4-8-8 was 42 cents and the total of other costs was 39 cents, making a total of 81 cents or a saving of 19% to the farmer over what he would pay for the same plant food in a 3-6-6 grade. When the same plant-food materials were used to make a 5-10-10 grade, the cost of materials

Table 1.

Tonnage and Plant-Food Content of Materials Used to Make Mixed Fertilizers in 1939

	Short tons materials	Analysis	Short tons		
			Nitrogen	Available phosphoric Acid	Potash
Ammonium sulphate	339,590	20.7	70,295		
Sodium nitrate	87,793	16.0	14,047		
Anhydrous ammonia	13,047	82.0	10,698		
Aqua ammonia	77,289	20.6	15,922		
Cyanamid	34,779	22.0	7,651		
Urea	16,305	42.0	6,848		
Ammonium phosphate	27,356	13.0-35.0	3,556	9,575	
Cal Nitro	45,145	18.0	8,126		
Other inorganic nitrogenous materials	69,476	33.0	22,927		
Cottonseed meal	75,903	6.5-2.6-1.8	4,934	1,973	1,366
Other seed meals	10,462	7.0-2.0-2.0	732	209	209
Tankage, process	92,638	8.0-0.6	7,782	556	
Tankage, animal	53,951	7.5-10.4	4,046	5,611	
Tankage, garbage	31,091	3.0-3.0-1.1	933	933	342
Fish scrap	39,607	8.8-7.5	3,438	2,930	
Milorganite	40,000	6.0-2.7-0.6	2,400	1,080	240
Guano	27,063	7.0-9.0-2.5	1,894	2,436	677
Tobacco stems	50,000	2.0-0.7-6.1	1,000	350	3,050
Sewage sludge	17,300	4.5-2.3-0.5	779	398	87
Castor pomace	50,000	5.1-1.8-1.1	2,550	900	550
Cocoa by-products	25,000	3.5-1.5-2.5	875	375	625
Bone meal	15,775	3.2-24.8	505	3,912	
Double super	90,000	45.0		40,500	
Run-of-pile super	2,103,312	19.5		427,696	
Muriate of potash	424,532	58.5			248,351
Sulphate of potash	56,389	49.5			27,913
Manure salts	23,910	26.0			6,217
Kainit	19,434	20.0			3,887
Sulphate of potash-magnesia	12,000	26.0			3,120
Nitrate of soda-potash	50,000	14.5-15	7,250		7,500
Cotton hull ashes, wood ashes, etc.	4,066	5 to 6		203	244
Phosphate rock	30,994	4		1,240	
All other materials containing plant food	268,959				
Total	4,322,626		199,188	500,877	304,378
Average composition without filler			4.61	11.59	7.04
Total mixed fertilizers made	5,321,823		3.74	9.41	5.72
Average as reported by census			3.44	9.23	5.64

was 39 cents and other costs 32 cents, making a total of 71 cents, or 29% less than in the 3-6-6 grade. Further slight savings in the total cost per unit of plant food can be made by using more concentrated materials and raising the grade to a maximum of 9-18-18, but above 5-10-10 the materials required may even cost a few cents more. The savings are made on the freight, bags, and labor.

Improvement in Materials

In general, it may be said that with conditions as they are today mixed fertilizers cannot be economically prepared with less than 20% total plant food, and even some grades containing 20% nitrogen, phosphoric acid, and potash, when prepared in the best manner possible with the most economic materials, require some filler in the formula. The following formula, which was used to produce non-acid 2-8-10 fertilizer by a well-known company in Baltimore in 1941, is an example:

Ammoniating liquor	100	lbs.
Nitrate of soda	10	"
Superphosphate	833	"
Tobacco stems	100	"
Muriate of potash	327	"
Dolomite	100	"
Minor element material	5	"
Sand	525	"
Total	2,000	lbs.

It was shown by Mehring[2] that the average grade of superphosphate sold in the United States increased from 11% in 1880 to 18% in 1937, but that in some states almost all farmers were buying 20% superphosphate while in others 16% was almost always demanded. With present improved methods and quality of rock many manufacturers make run-of-pile superphosphate containing 20% or more available phosphoric oxide (P_2O_5) directly, but none, insofar as could be learned by asking most of the manufacturers, makes run-of-pile superphosphate containing less than 18.5% available P_2O_5, and the average is above 19.5%. In order to make one ton of 16% superphosphate from run-of-pile superphosphate, 200 to 400 pounds of sand or other material must be added to 1,600 to 1,800 pounds of run-of-pile material. Thus a unit of available P_2O_5 in 16% superphosphate always costs the farmer more than in 20% material. For example, at the average retail delivered prices quoted in the Eastern States in the present season a unit of P_2O_5 in 16% superphosphate costs from 6 to 15, with an average of 11, cents more than in 20% goods. Ordinarily, the only differences between eight 200-pound bags of 20% and 10 bags of 16% superphosphate are that the farmer has to pay about $1.75 more for the latter and then he has to struggle with the two extra bags. When he gets through he will have no more crop, but he will have two extra second-hand burlap sacks. Pretty expensive sacks!

Most of the muriate of potash formerly imported from Europe was 50% grade, and farmers became accustomed to using this grade. On the other hand, all American companies for the most part produce 60% or higher analysis material in their refining processes. Nevertheless, many farmers and fertilizer manufacturers still order 50% material. In the past season 42,000 tons, or 15% of the muriate delivered by American producers to fertilizer manufacturers, were 50% grade, which under American conditions, usually is prepared by diluting 60% goods with filler. The bulk of that sold to farmers, however, is still the 50% grade, which indicates that a lot of dilution also occurs in the hands of distributors, who are not altogether to blame for it.

Very little 14 to 20% potash salts has been imported since 1938 and not one ton in 1941, although nearly all of our potash was in this form until the beginning of the first World War. The old-fashioned kainit contained large proportions of magnesium and sulphates, but the kainit imported from Europe in recent years was mainly a mixture of muriate and common salt. None of the domestic companies has ever produced real kainit. In 1940, 98.8% of the potash delivered to customers by members of the American Potash Institute was in the form of salts containing 50% or more potash, and the remaining 1.2% of deliveries were 25 or 30% manure salts. There was not a ton of 14 or 20% salt sold by producers, but the state tonnage reports show that large quantities of something claimed to be kainit is still being sold to farmers. At the time of writing, state tonnage reports had been received from only three states for the season ending June 30, 1941. These three showed sales of 15,190 tons of 14 and 20% kainit. In 1939, however, these states used more than half of the total consumption of kainit and only a little larger tonnage than in 1941.

At prices quoted during the present season, a unit of potash costs the farmer on a delivered basis approximately as follows:

	Retail price per ton	Cost per unit
20% kainit	$31.50	$1.58
50% muriate	45.00	.90
60% muriate	48.00	.80

(Continued on page 22)

[2] Grades of Superphosphate Sold to Farmers in the U. S., A. L. Mehring, Fertilizer Review 14, No. 1, 3 and 12-13, 1939.

Effect of Phosphate on the Hardness of Soil*

By JESSE GREEN
Chief Agronomist, Anaconda Sales Company

IN recent years the farmer has observed that the soil on many farms became harder on drying than when the land was new. A belief has grown up that phosphate fertilizer is the cause. It is true that soils harden more after long periods of cropping than when the soil was first plowed. The reason for this change will be discussed later. The effect of phosphate on hardness will be shown by the tests that follow.

Methods of Procedure

Samples of typical beet soils were taken from the Sidney district in Northeastern Montana, the Huntley district in Central Montana and the Lovell district in Northern Wyoming. The samples were taken from the top six inches of soil. They were air-dried and ground, after which two portions of ten pounds each were taken from each soil.

To one of the portions of each soil treble superphosphate was added at the rate of two tons per acre.**

There are 2,000,000 pounds of soil on an acre 6⅔ inches deep. For the ten-pound samples of soil used in these tests only .02 pound of phosphate was used. If the phosphate had been reduced to the amount applied in practice (125 pounds per acre) only .0006 pound could have been used with the 10-pound samples of soil.

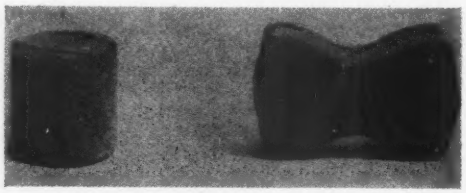
To the other portion no phosphate was added. Both of these samples were moistened with the same amount of water or to such a consistency as to make good bricks.

Two kinds of blocks were made as shown in Figure 1.

The cylindrical block (A) was made to show how the soils would resist a crushing strain when treated with phosphate and when not treated. These blocks were made in a mould 1½ inches in diameter and 1½ inches long. The elongated block (B) is the kind used in cement work. It was made to show tensile strength or the force required to pull apart the block at its narrowest dimension, which has a cross sectional area of 1 square inch.

These blocks were dried in a cool basement for two weeks and finally for two more weeks in a warm, dry attic room. These conditions are not exactly comparable to field conditions but it was necessary to get uniform drying on all samples without cracking so that measurements of their breaking strength could be determined with accuracy.

After drying, the blocks were broken in two machines. The first machine exerted a crushing pressure on the cylinder. The force required to break the sample was measured in pounds. In the second machine the other type of block was pulled apart. The force in this case was also recorded in pounds. The broken blocks are shown in Fig. 2.



A. B.

FIG. 1.

FIG. 2. Test Blocks After Breaking.

Ten blocks of each type were broken, of the phosphated and of the not phosphated soil. The average of each series of blocks is reported in Table I. The values given for crushing strength were obtained by breaking the cylindrical blocks, while the tensile strength was found by pulling apart the 1 inch square section of soil made for that purpose.

(Continued on page 24)

* Reprinted from "New Agriculture."

** Note: Two tons of fertilizer is an excessive amount to add to an acre of soil but in order to show if phosphate effected the physical properties of the soil a large amount was used.

McCARTY JOINS WPB STAFF IN WASHINGTON

George W. McCarty, vice-president of Ashcraft-Wilkinson Company, Atlanta, has been appointed to a position in the Nitrates Division of the War Production Board under Donald M. Nelson. He has been granted a leave of absence by his Company for the duration of the war and thus joins the distinguished Company of dollar-a-year men who are giving of their services to the country during the emergency.

Mr. McCarty will be located at Washington where he will handle the allocation and distribution of nitrates. During the first World War, he was given a leave of absence by his firm to serve in the Navy.

SULPHATE OF AMMONIA, 1941

The production of by-product sulphate of ammonia during December, 1941, reached record levels, according to figures issued by the U. S. Bureau of Mines. During that months, 65,620 tons were produced, an increase of 7 per cent over November and about 1 per cent above the previous high month of January, 1941. Shipments during the month (67,578 tons) also increased by 8 per cent, leaving stocks on hand smaller by about 2,000 tons.

	Sulphate of Ammonia Tons	Ammonia Liquor NH_3 Content Tons
Production:		
December, 1941	65,620	2,809
November, 1941	61,359	2,537
December, 1940	64,475	2,669
Calendar year, 1941	745,384	31,676
Calendar year, 1940	718,231	28,470
Shipments:		
December, 1941	67,578	3,099
November, 1941	62,190	2,732
December, 1940	71,326	3,006
Stocks on hand:		
December 31, 1941	31,094	756
November 30, 1941	33,212	1,124
December 31, 1940	44,542	1,266
November 30, 1940	51,397	1,837

Production During 1941

	Sulphate of Ammonia Tons	Ammonia Liquor Tons NH_3
January	64,669	2,663
February	58,359	2,341
March	64,524	2,745
April	57,916	2,583
May	61,495	2,679
June	61,392	2,703
July	62,585	2,738
August	62,416	2,687
September	61,676	2,537
October	63,373	2,654
November	61,359	2,537
December	65,620	2,809
Total	745,384	31,676

Production for the year also increased about 4 per cent over 1940, the totals being 745,384 and 718,231 tons respectively. In comparison with the record year of 1929 when total by-product ammonia (figured as sulphate of ammonia equivalent) came to 921,000 tons. the year 1941 produced about 900,000 tons when figured on the same basis.

KOLB APPOINTED SALES MANAGER OF AMERICAN POTASH & CHEMICAL CORP.

On February 1st the American Potash & Chemical Corporation, New York City, announced the appointment of E. M. Kolb as Manager of Potash Sales.

Mr. Kolb has been associated with the American Potash & Chemical Corporation since February, 1932. In 1934, he opened a branch sales office in Baltimore and remained in charge there until September, 1939, when the branch office was closed. Since that time he has been assigned to the general sales office in New York.

E. M. KOLB

Mr. Kolb was graduated from the University of Missouri and, previous to coming to the American Potash & Chemical Corporation in 1932, he was associated with the Eagle Picher Lead Company.

Ceiling on Sulphate of Ammonia Prices Requested

ON February 12th, Leon Henderson, Administrator of the Office of Price Administration addressed a letter to all fertilizer manufacturers and wholesale dealers in sulphate of ammonia, recommending a ceiling on the resale prices of sulphate of ammonia. The margin requested on resale of this material was set at not more than $3.50 per ton to cover all services performed by the reseller, and in addition an amount not to exceed $3.00 to cover costs for bags and bagging.

At the same time, a letter was addressed to all producers, sales agents and brokers of sulphate of ammonia, confirming the ceiling on original sales of this material, which had been set in May, 1941. This schedule called for a contract price of $28.00 per ton at inland ovens or $29.00 per ton at the ports, with spot sales $1.00 per ton additional.

The test of the two letters is as follows:

OFFICE OF PRICE ADMINISTRATION
WASHINGTON, D. C.

February 12, 1942.

To Producers, Sales Agents and Brokers of Sulphate of Ammonia.

Gentlemen:

On May 22, 1941, as you will recall, we requested that the prices on original sales of ammonium sulphate be restricted to not more than $28.00 a ton at inland ovens and $29.00 a ton at ports, on contract business, with spot prices $1.00 per ton higher.

The spring fertilizer season for the year 1942 is now at hand. We now supplement our previous request and ask you and other producers of ammonium sulphate, their sales agents, and brokers acting in connection with sales by such persons, not to charge on contract business in excess of the lower of the following prices:

(a) The base price of $28.00 per ton at inland oven, plus the transportation charge to buyer's destination from the inland oven nearest to such destination; or

(b) The base price of $29.00 per ton at port, plus the transportation charge to buyer's destination from the port nearest to such destination.

In determining the maximum prices for spot sales, $1.00 per ton may be added to the above prices.

The early stage of the spring fertilizer season is ordinarily characterized by some adjustment of ammonium sulphate inventories between and among fertilizer manufacturers, and, to some extent, other types of handlers, involving the shift of available surpluses to points at which additional supplies are needed to fulfill commitments or satisfy spot demand.

In order to deal effectively with this "readjustment" problem, we are now supplementing our letter of May 22, 1941, with a further one, addressed to all fertilizer manufacturers and mixers, brokers and wholesale handlers, who may engage in, or be concerned with, the resale of ammonium sulphate. A copy of such letter is enclosed herewith for your information.

Your continued cooperation is requested with respect to our efforts to prevent inflation in the prices of ammonium sulphate.

Sincerely yours,

LEON HENDERSON, *Administrator.*

OFFICE OF PRICE ADMINISTRATION
WASHINGTON, D. C.

February 12, 1942.

To All Fertilizer Manufacturers, Mixers, Brokers, and Wholesale Handlers of Sulphate of Ammonia.

Gentlemen:

On May 22, 1941, we requested that the prices on original sales of ammonium sulphate be restricted to not more than $28 a ton at inland ovens, and $29 a ton at ports, on contract business, with spot prices $1 per ton higher.

The spring fertilizer season for the year 1942 is now at hand. As you will note from the enclosed copy of a letter being sent to producers of ammonium sulphate, their sales agents and brokers, we are now supplementing the request made in our letter of May 22, 1941.

The early stage of the spring fertilizer season is ordinarily characterized by some ad-

justment of ammonium sulphate inventories between and among fertilizer manufacturers and mixers, and, to some extent, other types of handlers, involving movements of available surpluses to points at which additional supplies are needed to fulfill commitments or satisfy spot demand.

In order to deal effectively with the problems incident to this seasonal readjustment, we are now requesting you, as well as all other fertilizer manufacturers, mixers, brokers and wholesale handlers, to restrict the resale price of ammonium sulphate to not more than the following, f.o.b. the storage point, from which the material resold is actually shipped.

(a) The lowest of the following sums: (1) the actual price and transportation charge paid by the reseller for his purchase of the ammonium sulphate; (2) the base price of $28 per ton, plus the transportation charge to the storage point from the inland oven nearest to the storage point; or (3) the base price of $29 per ton, plus the transportation charge to the storage point from the port nearest to the storage point; plus

(b) A total margin on any such resale of not more than $3.50 per ton, which shall cover any and all services actually performed and expenses actually incurred by the reseller, including, but not limited to, unloading, reloading, storage, handling, overhead, shrinkage and any commissions or other compensation allowed to brokers or other persons in connection with the resale; plus

(c) A sum reflecting any actual costs, or if not ascertainable, a reasonable estimate thereof, incurred by the reseller for bags and bagging, but in no event to exceed $3.00 per ton.

Where the ammonium sulphate to be resold was purchased on a spot basis, $1.00 per ton may be added to the base price of $28.00 and $29.00 per ton referred to in subdivisions (2) and (3) of paragraph (a) above.

The foregoing request is applicable to any and all resales of ammonium sulphate except retail sales.

This request is subject to revocation, suspension, or modification in whole or in part, in such manner and at such times as the Office of Price Administration may deem appropriate.

If at any time compliance with the foregoing request is deemed to impose undue hardship, you may communicate with this Office in connection therewith.

Sincerely yours,

LEON HENDERSON, *Administrator.*

AAA Changes 1942 Program

In order to aid and speed the agricultural war production effort, further changes have been made in the 1942 conservation program of the Agricultural Adjustment Administration in which some 6 million American farmers will participate.

The new amendments are intended to strengthen previous 1942 conservation program changes, which in general have opened the way to greater plantings of essential war crops, and at the same time have provided for maintenance of minimum soil-building requirements.

Included in the new changes is authority to furnish farmers soybean and castor bean seeds in limited areas of the South and Southwest, thus stimulating production of oil crops where production goals might otherwise be more difficult to reach.

This amendment, together with another, providing that full payment will be made on peanut acreage allotments only if at least 80 per cent of the allotment is planted, is expected to help relieve the shortage of fats and oils, imports of which have been greatly reduced since Pearl Harbor. In addition to peanuts grown on allotted acres for both edible or oil purposes, the 1942 Food For Freedom goals calls for 3,400,000 acres of peanuts exclusively for crushing into oil, a total of 5,000,000 acres.

Other changes include:

An 80 per cent provision for potatoes similar to that for peanuts;

A provision removing any deduction for exceeding the rice allotment and substituting in its place a provision requiring that 10 times the payment rate be deducted for each acre by which the rice acreage planted is less than the acreage allotment. The maximum deduction under this provision is limited to the maximum rice payment for the farm;

Another adding rye for pasture to the list of crops which will qualify for meeting the minimum soil conserving acreage requirement;

Two provisions lending more flexibility to wheat and corn allotment regulations, thus assuring ample feed for the livestock production so vital to the war effort of America and her Allies. These provide (1) that if wheat acreage totally destroyed by causes beyond control of the grower is replaced, the original acreage will not be counted as planted to wheat and (2) that corn may be planted on any farm up to 130 per cent of the corn allotment acreage without deduction in payments other than that on corn.

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No Inflation

Secretary of Agriculture Claude R. Wickard, and Leon Henderson, Administrator of the Office of Price Administration, made public on February 3rd the following joint statement:

"With the passage of the Price Control Act, the Office of Price Administration and the Department of Agriculture intend to spare no effort to prevent inflation. These two agencies share this important responsibility and we are in complete agreement as to objectives to be achieved. Successful prosecution of the war by ourselves and our allies requires that the disorganizing influences of inflationary price movements be eliminated. Preventing wartime inflation will minimize the danger of another post-war deflation, and so contribute to winning the peace. If inflation is to be controlled, it is now especially important that effective, positive steps be taken to stabilize the cost of living. The Department of Agriculture and the Office of Price Administration intend to pool resources to do all they can to accomplish this end.

"First of all we must have abundant production and the Department of Agriculture intends to see that every possible step is taken to insure abundant supplies for all. This has been and will remain the consumer's best assurance of fair prices. Government-owned stocks of grains and cotton will continue to be used to supplement private stocks. Farm legislation and the farm production goals for 1942 have now placed floors under the farm prices of all major products at levels sufficient to protect farmers in carrying out a great increase in production. Steps will be taken to keep feedstuffs at reasonable levels in order that increased production of meats and livestock products will not be hampered by high feed costs. The Office of Price Administration will use its powers to see that prices of the things that farmers buy are held down, so that farm production will not be restricted by unnecessarily high production costs.

"A high level of production will not in all cases be sufficient. Where prices get out of line the Office of Price Administration with the advice and assistance of the Department will establish maximum prices. In such cases it will see that this protection is afforded all the way through the channels of distribution to the ultimate consumers. In those cases where there is not enough to go around, steps will also be taken to assure that there is fair distribution to all.

"The American people should realize that it will be the objective of their government to stabilize the cost of living. They, too, can do their part. There is no occasion for hoarding of food. Total supplies of most staple foods are at record or near record levels. Families who hoarded in the past were simply misguided. Now they are both misguided and unpatriotic, for such buying upsets markets and encourages inflationary price advances.

"It should be a point of pride with every good American not to hoard or to waste food. Consumers should buy more of commodities which are plentiful in supply. Thus, they can assist farmers and stimulate the output of larger supplies by directing their purchases to commodities that are relatively abundant. From time to time the Department of Agriculture and the Office of Price Administration will draw the attention of consumers to commodities which are in relative abundance, and to desirable shifts in food habits.

"We should like to repeat that the government intends to mobilize its full resources for all-out agricultural production at prices fair to farmers and consumers. Our aim is to stabilize living costs and prevent war-time inflation or post-war deflation. We invite the assistance of farmers and consumers in seeing that the job is done."

WITH GOOD CARE, SACKS AND BAGS LAST LONGER

The care of bags and sacks has become an important economy on farms, says the U. S. Department of Agriculture, as war has restricted shipments of jute, the raw material of burlap, and the entire output of canvas and duck has been allotted for military purposes.

Practical ways of conserving bags, as outlined by M. A. R. Kelley of the Bureau of Agricultural Chemistry and Engineering, are: Pile so as to keep bags dry and so as to discourage raids by rats and mice. Prevent unnecessary wear and tear. Shake out empties into containers so that residue and insects may be burned. Store empties so they will keep dry for use again. Damp burlap rots quickly. Do not store bags in the stable or in the poultry house where they may take up infection or lice and mites. Darn and patch bags to reclaim them and keep them in circulation.

There are two simple methods of stacking bagged feed, grain, fertilizer or other materials. One way is to stand the first tier of sacks on end on a movable floor of narrow boards nailed to joists. The sacks are set far enough apart to admit air and light and to permit patrol by cats and small dogs. The air keeps the bags dry. The light, cats and dogs keep down inroads of rodents. Space and light also decrease the number of cuts by rats and mice. Other tiers of sacks are laid flat, each tier at right angles to the previous tier, an arrangement which admits air and light. A second method is to lay a tier of sacks flat on two parallel timbers or peeled logs. Each tier is laid at right angles to the previous tier.

Bags and sacks well cared for can be used over and over, but in reuse there is some danger of spreading livestock diseases from farm to farm. State laws as to re-use must be observed. Mills and dealers find it feasible to sterilize bags with steam under pressure, but as a rule it is inconvenient for individual farmers.

Regulations as to reuse of feed and fertilizer sacks as containers for these products for sale in general are that each sack should be properly labeled with tags or stencils. A sack is permitted only two sale usings when stencils are used, one by reversing the sack, but unstenciled tags bearing the required information make possible additional use.

Obituary

WILLIS R. DRESSER

Willis R. Dresser, former vice-president and treasurer of Summers Fertilizer Company, died at St. Petersburg, Fla., on January 31st in his eighty-second year. Mr. Dresser was born in Princeton, Maine, and, after graduating from Philips Exeter Academy in 1881, taught school for a few years. In 1890 he joined the Bowker Fertilizer Co. as salesman for Aroostook County. From 1912 to 1920 he was connected with the International Agricultural Corporation. When the Summers Fertilizer Company was organized in 1921, Mr. Dresser was one of the original incorporators and represented the company at their Maine plant until his retirement in 1935.

He was one of the founders of the St. Croix Rotary Club and was active in local and state affairs. Mr. Dresser frequently attended the conventions of the National Fertilizer Association and was keenly interested in the industry, even after his retirement. He is survived by his widow and three sons, one of whom, Walter E. Dresser, is connected with the Summers Company as assistant manager of their St. Stephens, New Brunswick, branch.

January Tag Sales

Farmers have been asked this year to cooperate in the war effort by buying their fertilizer early, thus helping to prevent a congestion in transportation facilities later on when war materials will be moving in an ever increasing volume. Early buying, which the industry has encouraged for years, will also give assurance to fertilizer users that they will have their needed supply available at planting time. However, farmers should also be advised to practice correct timing, particularly as to their top and side dressing materials. Delivery of nitrate of soda, for instance, for later application should not be insisted on to the detriment of earlier crops.

Proof that farmers are following an early buying program is furnished by the data on fertilizer tax tag sales in January. Aggregate sales in the 17 reporting States were two and a third times as large as in January, 1941. They amounted to 1,273,000 tons, a quantity which is normally not reached until March.

Such a large tonnage does not, of course, represent buying for immediate use, as actual consumption in the first several weeks of the year is very small. The spring requirements are being taken care of early, and the abnormally heavy sales in January mean that sales in later months will be smaller than they would be otherwise.

The comparisons in the following table are of interest in showing the results of the "buy early" advice, but they do not afford any indication of the trend of consumption.

FERTILIZER TAX TAG SALES

State	January 1942 Per Cent of 1941	January 1942 Tons	January 1941 Tons	January 1940 Tons	July-January 1941-42 Per Cent of 1941	July-January 1941-42 Tons	July-January 1940-41 Tons	July-January 1939-40 Tons
Virginia	285	93,048	32,650	34,073	144	194,112	134,384	139,510
N. Carolina	336	360,958	107,548	82,683	243	523,850	215,424	198,550
S. Carolina	242	121,173	50,102	45,145	188	189,311	100,908	89,090
Georgia	176	79,249	45,082	28,487	149	143,479	96,587	54,103
Florida	114	92,157	81,094	75,196	115	412,562	359,065	367,163
Alabama	246	105,350	42,900	33,600	210	126,000	60,100	51,250
Mississippi	117	73,950	63,250	54,450	141	127,825	90,913	107,615
Tennessee	203	15,539	7,658	100	103	36,081	35,126	15,369
Arkansas	133	37,900	28,550	19,050	141	51,000	36,200	28,300
Louisiana	66	25,750	38,950	22,150	96	60,400	63,064	59,162
Texas	121	24,625	20,360	13,793	137	50,230	36,653	28,645
Oklahoma	26	650	2,500	1,662	107	4,725	4,415	3,086
Total South	198	1,030,349	520,644	410,389	156	1,919,575	1,232,839	1,141,843
Indiana	...	185,617	7,761	42,125	247	289,882	117,129	147,956
Illinois	...	15,365	923	1,080	193	31,818	16,473	14,961
Kentucky	273	16,623	6,088	2,450	123	40,640	32,928	29,903
Missouri	352	24,707	7,016	2,029	110	75,368	68,414	48,894
Kansas	...	15	3,340	950	73	13,633	18,558	13,861
Total Midwest	964	242,327	25,128	48,634	178	451,341	253,502	255,575
Grand Total	233	1,272,676	545,772	459,023	160	2,370,916	1,486,341	1,397,418

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FERTILIZER MATERIALS MARKET

NEW YORK

Prices on Domestic Nitrate of Soda Announced. Available Supply Small. Urgent Demand for Deliveries of Materials Because of Early Fertilizer Buying by Farmers.

Exclusive Correspondence to "The American Fertilizer."

NEW YORK, February 10, 1942.

Nitrate of Soda

The principal happening in the fertilizer materials market during the past week was the announcement by the sellers of domestic nitrate of soda announcing their price of $28 per ton, bulk basis, f.o.b. Atlantic and Gulf ports; or $27 per ton, f.o.b. Hopewell, Virginia.

This price was made, if and when material is available, but it is understood that very little domestic nitrate of soda would be available during the season. The price for bagging of domestic nitrate of soda was also announced, the price for bags being considerably under the charge indicated by sulphate of ammonia producers.

The price of Chilean sodium nitrate remains unchanged, the old price having been extended through February.

Sulphate of Ammonia

Sulphate of ammonia continues in heavy demand, with all fertilizer manufacturers pressing for deliveries and most producers being considerably behind in deliveries against contract obligations. With the heavier demand for mixed fertilizers considerably earlier than usual, the need for deliveries of sulphate of ammonia becomes more acute.

Potash

Potash salts are also in heavy demand but deliveries against contracts have been fairly well sustained.

Nitrogenous

Nitrogenous material is also in a well sold up condition, with prices steady.

Superphosphate

The demand for superphosphate continues and this material is short supply, although contract deliveries are fairly satisfactory.

BALTIMORE

Materials Business Routine. Little Resale Material on Market. Scarcity of Some Materials Evident.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, February 10, 1942.

Business in fertilizer materials has been more or less of routine character during the past two weeks, and manufacturers getting ready for the spring shipping season.

Ammoniates.—The market on ground animal tankage for feeding purposes continues high, and it is nominally quoted at $6.60 per unit of nitrogen and 10 cents per unit of B.P.L., f.o.b. eastern producing points, but without any interest being shown as far as manufacturers are concerned. Offerings of packing house tankage suitable for fertilizer are few and far between.

Nitrogenous Material. — There has been slightly better interest recently manifested in this article, which is being nominally quoted at $4.00 per unit of nitrogen, f.o.b. Baltimore.

Sulphate of Ammonia.—All fertilizer manufacturers are conserving their supplies and there are no re-sale offerings on the market.

Nitrate of Soda.—There has been practically no tonnage delivered during February to buyers in this section under OPM supervision, but many of the manufacturers are urgently in need of supplies for top dressing and are hopeful that normal tonnage will be available during the next month. Importers of the Chilean material have extended the current prices without change through the month of March at $30.00 per ton in bulk; $33.00 in 100-lb. bags and $32.40 in 200-lb. bags, ex port warehouse.

Fish Meal.—Temporary ceiling price of $72.50 per ton for 60 per cent grade, f.o.b. Baltimore is quoted, packed in new, 100-lb. bags.

Superphosphate.—There has been no change

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in the market, and producers continue to quote at 60 cents per unit for run-of-pile, basis 16 per cent, or $10.10 per ton of 2,000 lb., for flat 16 per cent grade, both in bulk, f.o.b. Baltimore.

Bone Meal.—There is nothing new as far as this material is concerned, and there has been no activity since these products were included in OPA order No. 74.

Potash.—From present indications, it would appear as though there will be ample stocks for buyers' normal requirements during the coming spring season.

Bags.—The bag situation continues critical, both from the standpoint of burlap as well as paper and second-hand bags, all of which are scarce and probably will continue so throughout the season.

ATLANTA

Allocations of Nitrate of Soda Issued. No Change in General Materials Market Conditions.

Exclusive Correspondence to "The American Fertilizer."

ATLANTA, February 9, 1942.

Nitrate of soda allotments were issued early this week and all manufacturers have been notified of their February allotments. A continued shortage is expected, and it appears that the government will allot from time to time such available nitrate over and above war requirements as supplies permit.

There is no particular change in the general market conditions. The general markets are as follows:

South American Blood.—$5.25 ($6.38 per unit N), c.i.f. ports.

Imported Tankage.—$5.25 ($6.38 per unit N) and 10 cents, c.i.f. ports.

Domestic Nitrogenous.—$3.25 ($3.95 per unit N), western producing points.

Menhaden Scrap.—Nothing offered.

Acidulated Fish.—Nothing offered.

Sulphate of Ammonia.—Continued activity in resale market, but very limited tonnage turnover.

Nitrate of Soda.—Allocated by OPM, no change in price.

Cottonseed Meal.—Prime 8 per cent, $39.00, Memphis; $41.00, southeastern mills.

CHARLESTON

Early Fertilizer Buying Evident. Greater Demand for Nitrogenous. Scarcity in Some Materials.

Exclusive Correspondence to "The American Fertilizer."

CHARLESTON, February 10, 1942.

The local fertilizer manufacturers are considerably ahead of the same date last season, in orders received.

Nitrogenous.—Inquiries on this have picked up considerably in the past week and supplies are scarce. Quite a number of manufacturers are not able to obtain the necessary minerals, and therefore are having to change their formulas and use more organics. The market is around $3.25 per unit of ammonia ($3.95 per unit N), f.o.b. western points; $3.60 per unit of ammonia ($4.37½ per unit N) ex vessel southern ports, prompt only.

Blood.—This material is quoted around $5.00 per unit of ammonia ($6.08 per unit N), f.o.b. ports, for imported material, but this is very scarce. The Chicago market is $5.25 to $5.40 per unit of ammonia ($6.38 to $6.56½ per unit N).

Fish Meal.—This material is almost unobtainable.

Cottonseed Meal.—8 per cent material is quoted at $43.00, Augusta; $40.50, Memphis. The 7 per cent grade is priced at $40.00, Augusta.

Superphosphate.—There are practically no offerings.

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CHICAGO

Demand for Fertilizer Organics Improved But Supplies Small. Feed Material Market Steady.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, February 9, 1942.

An improved inquiry for organics has developed but the market is almost bare of offerings. Sales have been announced of nitrogenous at sellers' advanced asking prices, after which further offerings were withdrawn. Southern reports indicate shipping orders for fertilizer are considerably over same period last year, and this no doubt is reflected in the renewed inquiry for materials.

A steady market is in evidence in the feed market, with producers of materials well sold up and releasing but small offerings.

Nominal prices are as follows: High-grade ground fertilizer tankage, $4.00 to $4.25 ($4.86 to $5.16½ per unit N) and 10 cents; standard grades crushed feeding tankage, $5.65 to $5.75 ($6.87 to $6.99 per unit N) and 10 cents; blood, $5.50 to $5.65 ($6.68½ to $6.87 per unit N); dry rendered tankage, $1.25 to $1.30 per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

Shortage of Water Still Evident. Phosphate Plant Being Enlarged. Increased Wage Scale Asked by CIO Union.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., February 9, 1942.

Some beautiful weather, interspersed with cold, rain and snow, has allowed a large amount of winter plowing to get under way, indicating that the storage reservoirs are not yet having much chance to recoup the drawdown necessitated by the shortage of water and the demand for power. It is unfortunate that the development of Duck River and its tributaries was not undertaken at the time it was advocated seven or eight years ago. This would have developed over 100,000 kw. and, by making year-round navigation possible from Columbia to the Ohio River, would have brought freight rates on phosphate rock down to lower figures.

The Hoover & Mason Phosphate Co. are rapidly at work increasing their grinding and bagging capacity fifty per cent to take care of the heavy demand of the Ruhm Phosphate & Chemical Co., for their regular customers, and for filling the large contract with AAA in Illinois. Some delay occurred by failure to secure promised priorities but these are now in hand or so reported.

The local CIO union has presented demands for increased hourly pay for some of the phosphate labor, amounting to about forty per cent, which if granted, as it seems likely to be, will necessitate another raise in price of phosphate rock about July 1st.

It is reported in Mt. Pleasant, but not confirmed, that the International Minerals & Chemical Corp., will establish offices at Mt. Pleasant, but it is not stated whether the Columbia office will be moved or not.

The critical paper situation and activity in both cement and ground phosphate rock demand, has caused some difficulty in securing multiwall bags in which these commodities are packed, but most demand has been supplied. Phosphate spreaders are unobtainable pending government priorities.

COTTON QUOTA VOTED

The results of the referendum on the continuation of the cotton marketing quota, held on December 13th, showed that 94 per cent of the 840,000 farmers voting were in favor of the quota. The present quotas will therefore remain in effect for the year beginning August 1, 1942.

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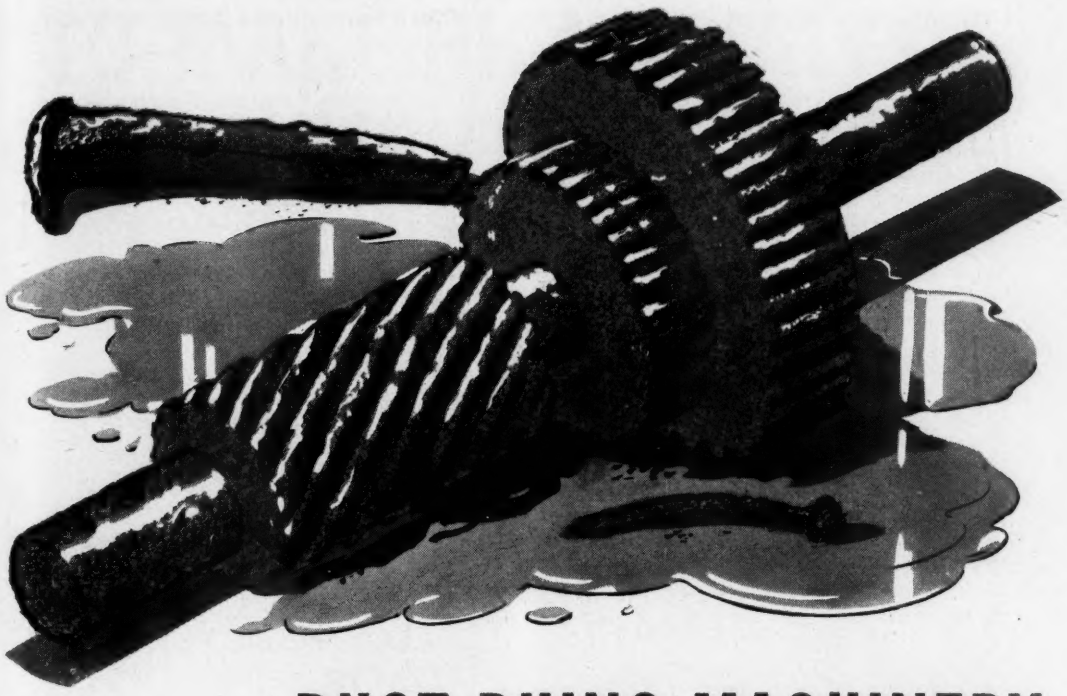

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Rationing Plan for Nitrate of Soda

The War Production Board started rationing nitrate of soda in January on a month-by-month basis. The officials in charge of the rationing determine directly how much is available for distribution each month for all purposes, including war purposes, but they depend upon other Government offices to tell them the needs for munitions, meat curing, agriculture, and other essential industries.

The needs of agriculture are determined by a committee appointed by the Secretary of Agriculture. This committee consists of 16 members, each of whom is an authority on some phase of fertilizer use or crop production. Each month, after considering all available information and statistics on the use of nitrate of soda in previous years and the magnitude of crops as set forth in the Department's 1942 production goals, the committee will determine the minimum requirements for the following month for each crop in each State, and the War Production Board will be advised accordingly.

Nitrate released in February in South Carolina for oats, for example, should be used in February for oats and not be saved for cotton or permitted to get into the hands of a farmer who will not need it until next May or June. Farmers must remember that sizable stocks are on hand in the United States and additional supplies are coming in from Chile. It is important that fertilizer manufacturers do not get unnecessarily concerned, because equitable allocations will be made for the cotton farmers and the corn farmers when the proper time comes.

It seems assured that supplies of mixed fertilizers, phosphates, and potash salts will be as large this spring as last. Nitrate of soda, which is used principally for side-dressing, is somewhat short, but it is almost certain that at least 50 per cent of the normal supply will be available and possibly enough may be brought in to make up a 90 per cent supply before the season is over.

In February, approximately the same quantities were allocated for agriculture as were actually applied to the soil in the same month of the previous year. Of course, this was less than the total distributed in February, 1941, because normally supplies are shipped to local dealers a month or so before they will be needed.

LIGHTNING FERTILIZES SOIL

Lightning, long-time foe of man, as been revealed by Westinghouse lightning engineers to be a friend, helping to produce food by fertilizing the soil, and also keeping the earth's "battery" charged. Two billion lightning strokes, approximately seven for every square mile of earth, perform useful work during the 16 million electrical storms that occur each year.

The action of the lightning in passing through the atmosphere with the speed of 60 million miles per hour releases nitrogen from the air. In the form of nitric acid, the nitrogen falls in rain drops and enriches the soil. Through this process, lightning annually produces nearly 100 million tons of nitric acid. This is more soil builder than is manufactured by all the world's fertilizer plants.

Lightning also restores the electricity that constantly seeps from the earth to clouds and thus keeps the earth charged. Negative electricity continuously leaks into the skies from the earth at the rate of 1,000 amperes. The

(Continued on page 24)

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Advertisements for sale of plants, machinery, etc., and for help and employment, in this column, same type as now used, 60 cents per line, each insertion.

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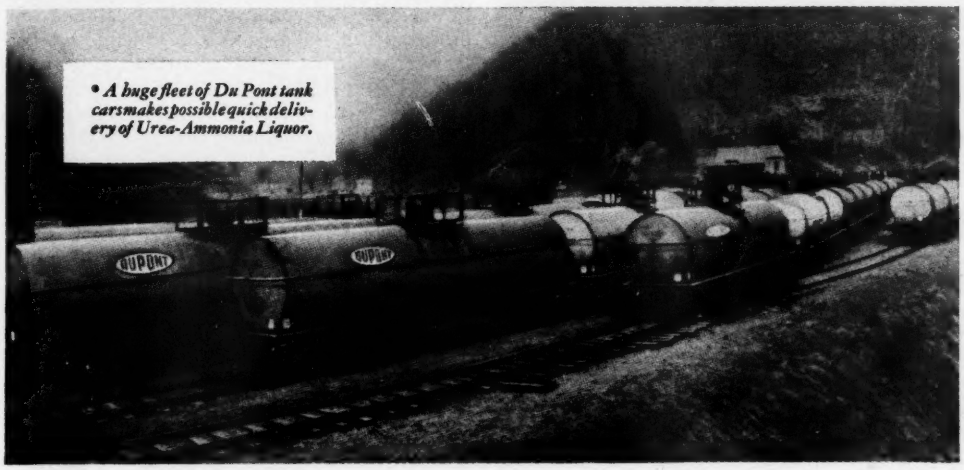
Pan Mixers—Wet Mixing
Swing Hammer and Cage Type Tailings Pulverizers
Vibrating Screens
Dust Weigh Hoppers
Acid Weigh Scales

STEDMAN'S FOUNDRY & MACHINE WORKS
AURORA, INDIANA, U. S. A. Founded 1834

TO MAKE HIGH-ANALYSIS COMPLETE FERTILIZERS...

you must formulate with high-analysis materials!



• A huge fleet of Du Pont tank cars makes possible quick delivery of Urea-Ammonia Liquor.

The manufacture of fertilizers containing 25 to 45% plant food calls for use of high-analysis materials such as Urea-Ammonia Liquor (UAL). Ammoniation of such grades with UAL makes possible:

Use of more dolomite, thus increasing content of calcium and magnesium and reducing acidity of the resultant mixture . . .

OR

Use of part ordinary superphosphate instead of all triple superphosphate, thus effecting a further saving in cost.

The nitrogen in UAL is completely available, leaching resistant, and relatively low in unit cost!

UAL-A UAL-B UAL-37

Specific information, giving typical formulas for making both high-analysis and single-strength mixtures with UAL, together with facts about the advantages and methods of cooling fertilizers for more rapid curing and superior condition, will be sent on request.

DUPONT
REG. U.S. PAT. OFF.

E. I. DU PONT DE NEMOURS & CO. (INC.)
AMMONIA DEPARTMENT • WILMINGTON, DELAWARE

HIGH ANALYSIS FERTILIZERS

(Continued from page 7)

The only thing a farmer gets nowadays in three tons of 20% kainit that he does not get in one ton of 60% muriate is, ordinarily, two tons of sand, common salt, or salt cake. The latter two in many soils will do more harm than good.

Filler and Defense

In normal times it may be true that if a farmer wants to buy an uneconomic grade of fertilizer, the manufacturer should make it for him, but if in war times such a policy materially injures our defense efforts, it is no longer true. The dilution of high-analysis materials to make lower analysis grades or mixtures not only unnecessarily adds to the price the farmer must pay, but uses up a lot of transportation facilities, labor, and bags, all of which are needed in winning the war.

Normally, a very important part of our domestic freight is hauled by coastwise and intercoastal ships. Many of these ships have been diverted to war use, and more could be used with great benefit if they could be spared from normal traffic. This diversion of ships, added to the greatly increased need for transportation due to war work, has begun to place a strain on our rail and truck transportation also. It is, therefore, becoming increasingly important to economize in transportation in every legitimate way.

It is not feasible to prohibit entirely the use of filler because some filler is desirable to adjust formulas, inasmuch as state laws require grades to be stated in whole numbers, and for other reasons. Nevertheless, a half million tons of unnecessary filler could be eliminated with real benefit to agriculture, the fertilizer industry, and the defense of our country.

The average mixed fertilizer moves about 100 miles. It requires the equivalent of 20,000 box cars moving 100 miles to haul the half million tons of unnecessary filler in mixed fertilizers. It requires roughly 500 cars to move the filler in 50% muriate from the refineries to fertilizer factories about 2,000 miles away. This is equivalent to 10,000 cars moving 100 miles. It also requires the equivalent of another 1,000 cars moving 100 miles to haul the filler in 16% superphosphate that could be eliminated if all of this grade was replaced with 18% superphosphate. So, adding these three items together we have a possible saving in transportation equivalent to a 100-mile movement of 31,000 cars.

It requires a lot of power and labor to provide the kiln-dried sand used as fertilizer filler, not to mention the additional labor required to handle the extra bulk of fertilizer produced.

It required the labor of 18,744 wage earners to produce 8,000,000 tons of fertilizers in 1939. It is rather difficult to determine how much of this labor could be saved by providing the same amount of plant food in 7,500,000 tons, but it would probably be of the order of the full working time of 1,000 men.

Two years ago a 200-pound burlap sack cost about 8 cents, and now it costs 19 cents at wholesale. Since all of our burlap and jute comes from India, it is questionable whether any more burlap can be imported for the duration of the war. The supply of burlap has been tight for some time, and many fertilizer manufacturers have already shifted to cotton or paper bags. We have plenty of certain kinds of pulp, but a very strong paper is required for fertilizer bags and a large part of the kind of pulp required for such paper was formerly imported from Norway, Sweden, and Finland. The number of spindles available is not sufficient to make all the extra cotton bags that will apparently be needed. It is therefore necessary to economize on bags. One-half million tons of filler require an annual supply of five million 200-pound bags.

For Better Soil Nutrients

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TENNESSEE CORPORATION

Soluble Mineral Elements

Zinc
SULPHATE
•
Manganese
SULPHATE
•
Iron
SULPHATE

MANUFACTURED BY

TENNESSEE CORPORATION
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For over 20 years we have served the Fertilizer Industry

ACID-PROOF CEMENT
Ready Mixed—For Immediate Use
Packed in 250-lb. Steel Drums
Dry-Packed in 100-lb. Bags

CHEMICAL PUTTY
Stops Acid, Gas and Water Leaks

QUARTZ PEBBLES
Graded to Size

FILTER GRAVEL, FILTER SAND

ACID VALVES

SOUTHERN DISTRIBUTORS OF
CALGON (Sodium Hexametaphosphate)

ACID BRICK, SPIRAL RINGS

Charlotte Chemical Laboratories
INCORPORATED
Laboratories, Plant, Office
CHARLOTTE, N. C.

DEPENDABLE!

- Large stocks of seasoned materials, available for prompt shipment keyed to your needs.
- Dependable analysis—and every shipment reaches you in good mechanical condition. Write or wire us your next order for

TRIPLE SUPERPHOSPHATE

46 to 48% Available Phosphoric Acid

We also manufacture
HIGH-GRADE SUPERPHOSPHATE

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Tampa, Florida

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A Mark of FLORIDA TRIPLE PHOSPHATE *Reliability*

SPECIFY
THREE ELEPHANT
BORAX

REG. U.S. PAT. OFF. REG. U.S. PAT. OFF.

. . . . WHEN BORON IS NEEDED TO CORRECT A DEFICIENCY OF THIS IMPORTANT SECONDARY ELEMENT

Agricultural authorities have shown that a lack of Boron in the soil can result in deficiency diseases which seriously impair the yield and quality of crops.

When Boron deficiencies are found, follow the recommendations of local County Agents or State Experiment Stations.

Information and references available on request.

AMERICAN POTASH & CHEMICAL CORPORATION
70 PINE STREET, NEW YORK CITY
Pioneer Producers of Muriate of Potash in America
See Page 4

To sum up, the elimination of the annual consumption of 500,000 tons of unnecessary filler will not only save the farmer about $5,000,000 a year but a lot of unnecessary labor as well. What is more important now, however, is that such a change would ease the strain on our transportation and bagging industries and strengthen our war effort.

It will require a lot of publicity and cooperation to bring about this desirable objective. In fact, many people feel that, due to the natural resistance of human beings to change of any kind, it can only be accomplished by legislation. Nevertheless, every year large numbers of farmers shift to higher analysis grades of fertilizer. It is felt that much good can be accomplished at this time if everyone who understands the situation will do what he can to explain it to farmers who do not understand. Farmers should be discouraged from buying kainit, 50% muriate of potash, or grades of superphosphate or mixed fertilizers containing less than 18 or 20% plant food. Instead, they should buy lesser quantities of 18 or 20% superphosphate, 60% muriate, or mixed fertilizers containing 20% or more plant food. In so doing they will not only help themselves but the country as well. Fertilizer manufacturers can cooperate by pointing out in their price lists and advertisements the savings to be made by using higher analysis grades and by discouraging the sale of uneconomic grades.

THE EFFECT OF PHOSPHATE ON THE HARDNESS OF SOIL

(Continued from page 8)

Table I

Phosphated Soil		Not Phosphated Soil	
Tensile Strength	Crushing Strength	Tensile Strength	Crushing Strength
Soil from Sidney, Montana			
132.1 lbs.	384.3 lbs.	137.1 lbs.	385.2*lbs.
Soil from Huntley, Montana			
164.1	539.9	186.9	541.4
Soil from Powell, Wyoming (Lovell District)			
151.0	462.2	156.5	489.3
Average of All Soils			
149.1	462.1	160.2	471.9

The above values for crushing strength represent the force required to crush a dried cylindrical block of soil 1½ inches by 1½ inches. Tensile strength is force necessary to pull apart a block of soil one inch in cross section. All values are for 10 tests except the one marked (*) which is for five tests only.

The results show consistently that the presence of phosphate in a dried block of soil reduced its strength.

The average tensile strength of phosphated soil was 149.1 pounds per square inch while the unphosphated samples had a strength of 160.2 pounds per square inch. The presence of phosphate in the blocks decreased the tensile strength 21.1 pounds or 13 per cent.

The effect on crushing strength was of the same order as that of tensile strength. The phosphated samples had a crushing strength of 462.1 pounds for a cylinder 1½ by 1½ inches. The value for the unphosphated samples was 471.9 pounds. The presence of phosphate in the soil decreased the strength of these blocks 9.1 pounds or 2 per cent.

The belief that phosphate fertilizer causes soil to harden is entirely unfounded.

The cause of increased hardening of soil observed in recent years is because of a decrease in organic matter. Intensive farming accompanied by heavy irrigation has reduced the humus content of the soil.

The mineral particles thus adhere more strongly together making clods that are harder to break.

The data presented above shows that even a large amount of phosphate does not harden the soil.

The writer wishes to express his appreciation for help in breaking the test blocks by Edward Dye, department civil engineering, Montana State College.

LIGHTNING FERTILIZES SOIL

(Continued from page 20)

power represented in this leakage is about 300,000 kilowatts—enough to drive 200 submarines. To offset this loss of electricity, the earth's surface must be struck by lightning at the average rate of 50 times a second, or about two billion times a year. The average stroke carries an electrical charge of 30 coulombs, representing about one billion kilowatts. This is more than the combined output of all the power houses in the world.

SOUTHERN PHOSPHATE CORPORATION

Miners of FLORIDA LAND PEBBLE

PHOSPHATE ROCK

— all commercial grades!

Plants at Sangully, Pauway, Medulla and Ridgewood, Fla.

MAIN OFFICE • *342 Madison Avenue* • NEW YORK CITY

JOS. H. SCHMALTZ

BROKER

FERTILIZER MATERIALS

Tankage
Blood
Bone
All
Ammoniates

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CHILEAN NITRATE OF SODA

Nitrogenous Materials

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Bone Meals

Manganese Sulphate

SOUTH AMERICAN DRY RENDERED TANKAGE

PEOPLES OFFICE BUILDING
Charleston, S. C.

WILLIAMS-WELLMANN BROKER

Baltimore, Maryland

Specializing in

Sulphate of Ammonia
Low Grade Ammoniates
Superphosphate
Sulphuric Acid
Bags

Inquiries and offerings invited

KEYSER BUILDING

February Report on Winter Crops

The cold weather and storms of late December and the first half of January hurt some winter vegetables and pastures in the South and Southwest and covered some western range areas but the latter part of January was favorable in most areas and most unusually mild in the North Central States and westward almost to the Rockies.

Prospects for citrus fruits remain about as they were a month ago and, with no unusual losses from freezing, the total production of oranges, grapefruit and lemons should be close to the record output of last season.

Reports on winter and early spring vegetables do not yet show any marked changes in the total supply except for a large increase in early cabbage.

January brought relatively favorable weather to citrus fruits in nearly all producing areas. Frosts occurred during the month in some sections of the four principal citrus States (California, Florida, Texas and Arizona), but temperatures were not low enough to cause appreciable damage.

Oranges

Total early and midseason orange production (including tangerines) is now placed at 42,194,000 boxes for the 1941-42 marketing season, compared with the 1940-41 crop of 41,576,000 boxes and the 1939-40 production of 38,763,000 boxes.

Production of early and midseason oranges in Florida, exclusive of tangerines, is now placed at 15,900,000 boxes—the same as last season (1940-41). Florida tangerine production is estimated at 2,100,000 boxes, compared with the 1940-41 crop of 2,700,000 boxes. Harvest in Florida has been running considerably later than last season, and movement is expected to continue several weeks later than for last season's crop. Some freezing weather occurred in north Florida during the first few days in February but caused no appreciable damage to citrus. In California, the navel and miscellaneous orange crop is now placed at 20,496,000 boxes. The 1940-41 production of these varieties in that State totalled 19,472,000 boxes. In central California, weather during January was somewhat cooler, and more overcast than usually is desirable for proper maturity of oranges at this time of year, but frequent rains over this area were beneficial to the crop. In southern California citrus areas, weather was generally favorable.

The Texas orange crop is indicated to be 2,900,000 boxes compared with 2,750,000 boxes last season. Arizona orange production is placed at 600,000 boxes compared with 500,000 boxes produced in 1940-41.

Grapefruit

The total United States grapefruit crop is indicated to be 41,440,000 boxes—4 per cent smaller than in 1940-41, but 18 per cent larger than in 1939-40. In Florida, production is placed at 21,400,000 boxes, compared with 24,600,000 boxes produced in 1940-41. The Florida crop of seedless varieties (mostly Marsh) is indicated to be 5 per cent larger than in 1940-41; but production of "seeded" varieties (Duncan and others of this type) is expected to be 22 per cent less than last season. The Texas grapefruit crop is estimated at 15,100,000 boxes, compared with last season's production of 13,800,000 boxes. To date, truck shipments of Texas grapefruit have accounted for only 29 per cent of total movement, compared with 52 per cent of total shipments by truck to the same date last season.

Arizona grapefruit production is estimated at 3,000,000 boxes. The 1940-41 crop in that State was 2,650,000 boxes. Freezing weather late in December and early in January—originally believed to have caused serious injury to fruit in some groves—apparently caused no appreciable damage. In California, grapefruit production is placed at 1,940,000 boxes, compared with the 1940-41 production of 1,983,000. Indicated production is about equally divided between the Desert Valleys and "other" areas. During the 1940-41 season, the Desert Valleys accounted for 48 per cent of the total—"other" areas, 52 per cent.

Lemons and Limes

Production of California lemons for the 1941-42 season is now indicated to be 14,220,000 boxes, compared with 17,099,000 in 1940-41, and 11,983,000 boxes in 1939-40. The Florida lime crop for 1941-42 is estimated at 120,000 boxes, compared with 80,000 boxes last season, and 95,000 boxes in 1939-40.

Valencia Oranges

The Florida Valencia orange crop, volume movement of which is not expected to start until after March 1st, is expected to reach 12,700,000 boxes, compared with 12,500,000 boxes produced during the 1940-41 season. Indicated production of Valencias in California, appreciable quantities of which will not move until after April 1st, is placed at 29,520,000 boxes. The 1940-41 Valencia crop in California totaled 30,006,000 boxes.

A WAR MESSAGE
to
ALL EMPLOYERS

★ From the United States Treasury Department ★

WINNING THIS WAR is going to take the mightiest effort America has ever made—in men, materials, and money!

An important part of the billions of dollars required to produce the planes, tanks, ships, and guns our Army and Navy need must come from the sale of Defense Bonds. Only by regular pay-day by pay-day investment of the American people can this be done.

Facing these facts, your Government needs, urgently, your cooperation with your employees in *immediately* enrolling them in

A PAY-ROLL SAVINGS PLAN

The voluntary Pay-Roll Savings Plan (approved by organized labor) provides for regular purchases by your employees of Defense Bonds through voluntary pay-roll allotments. All you do is hold the total funds authorized from pay-roll allotments in a separate account and deliver a Defense Bond to the employee each time his allotments accumulate to an amount sufficient to purchase a Bond.

You are under no obligation, other than your own interest in the future of your country, to install the Plan after you and your employees have given it consideration.

WHAT THE PAY-ROLL SAVINGS PLAN DOES

1. It provides immediate cash now to produce the finest, deadliest fighting equipment an Army and Navy ever needed to win. **2.** It gives every American wage earner the opportunity for financial participation in National Defense. **3.** By storing up wages, it will reduce the current demand for consumer goods while they are scarce, thus retarding inflation. **4.** It reduces the percentage of Defense financing that must be placed with banks, thus putting our emergency financing on a sounder basis. **5.** It builds a reserve buying power for the post-war purchase of civilian goods to keep our factories running after the war. **6.** It helps your employees provide for their future.

To get full facts on installing the
Pay-Roll Savings Plan, write TODAY to:
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709 12th Street, NW.,
Washington, D. C.

U. S. Defense BONDS ★ STAMPS

This space contributed to National Defense by

THE AMERICAN FERTILIZER

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, Allied Chemical & Dye Corp., New York City
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, Allied Chemical & Dye Corp., New York City
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, Allied Chemical & Dye Corp., New York City

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
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Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
[illegible]oast Borax Co., New York City.

[illegible]kinson Co., Atlanta, Ga.
[illegible]., H. J., New York City.
[illegible]aker, New York City.
[illegible]Co., The, Philadelphia, Pa.
[illegible] Company, New York City.
[illegible], Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
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For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

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American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
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Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

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Barrett Division, Allied Chemical & Dye Corp., New York City
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

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Sackett & Sons Co., The A. J., Baltimore, Md.
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Gascoyne & Co., Baltimore, Md.
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Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

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Huber & Company, New York City.
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Taylor, Henry L., Wilmington, N. C.
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Bradley & Baker, New York City.
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Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
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A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

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Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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Sackett & Sons Co., The A. J., Baltimore, Md.

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Link-Belt Company, Philadelphia, Chicago.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
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Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, Allied Chemical & Dye Corp., New York City
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, Allied Chemical & Dye Corp., New York City

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
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Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
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Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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Wellmann, William E., Baltimore, Md.

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PIPES—Chemical Stoneware
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PIPES—Wooden
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PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
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Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, Del.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
Union Potash & Chemical Co., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
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Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

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Schmaltz, Jos. H., Chicago, Ill.
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SEPARATORS—Including Vibrating
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SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
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Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
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SULPHATE OF AMMONIA
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
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McIver & Son, Alex. M., Charleston, S. C.
Taylor, Henry L., Wilmington, N. C.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Taylor, Henry L., Wilmington, N. C.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Wellmann, William E., Baltimore, Md.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
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Jett, Joseph C., Norfolk, Va.
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Schmaltz, Jos. H., Chicago, Ill.
Smith-Rowland, Norfolk, Va.
Taylor, Henry L., Wilmington, N. C.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
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TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

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Sackett & Sons Co., The A. J., Baltimore, Md.

UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

VALVES—Acid-Resisting
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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
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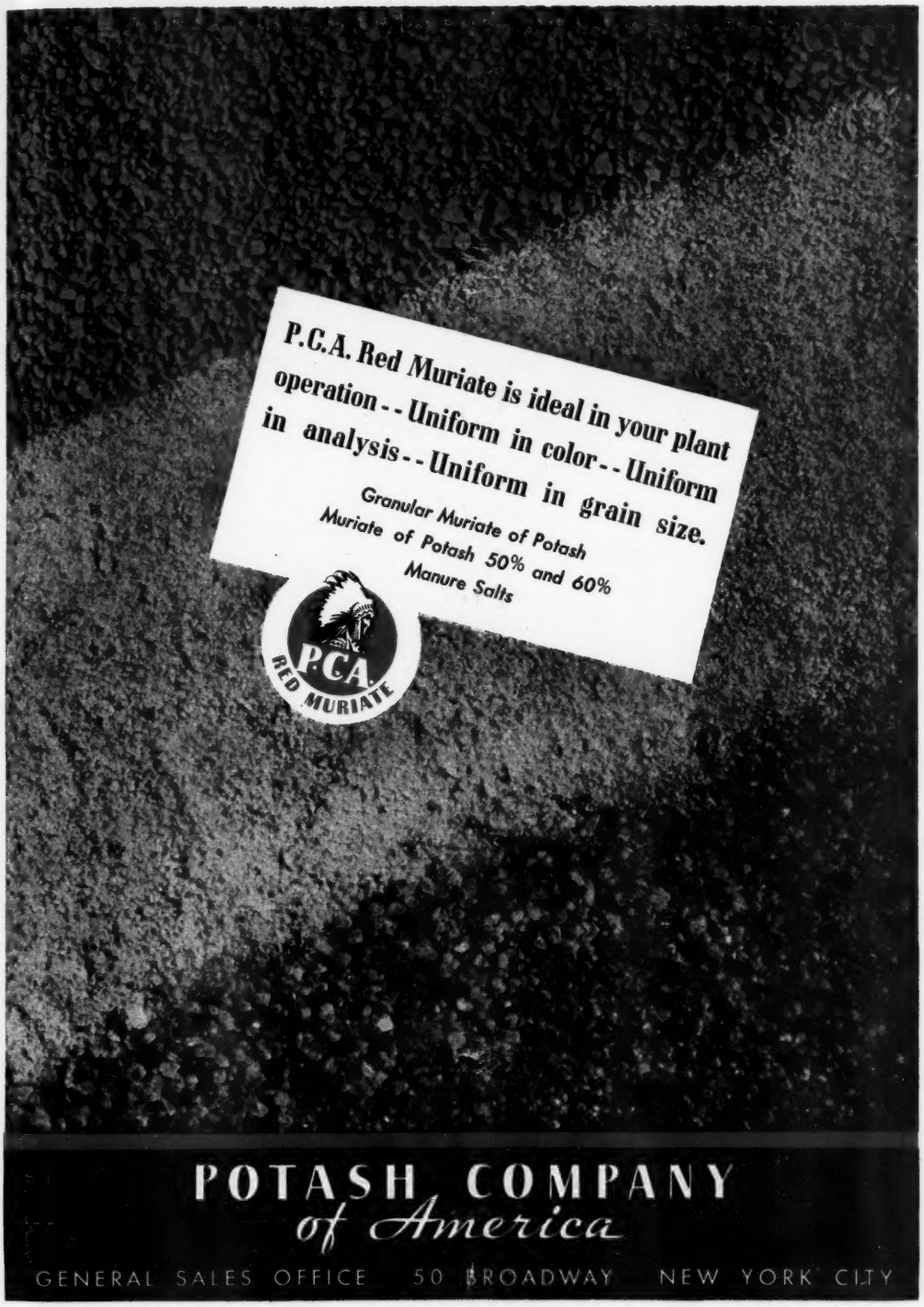
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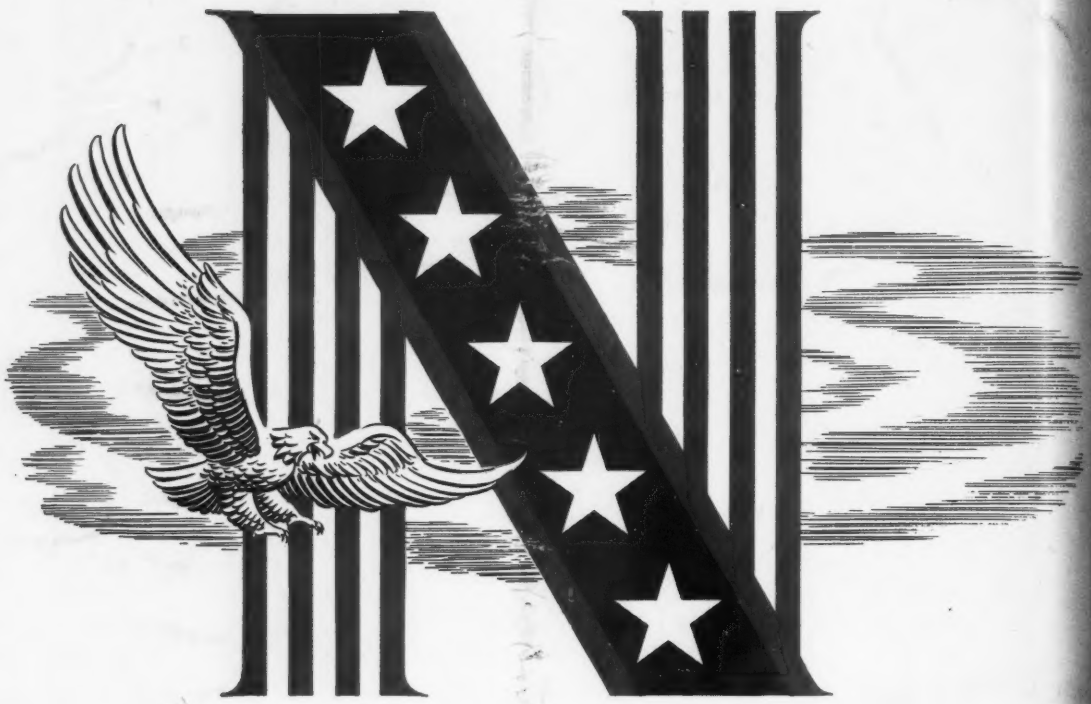

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